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Student Characteristics and Motivation in Rural High Schools

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This research tested a path model for how rural high school students' self-perceptions and environmental perceptions influence their course-related interest, school engagement, and ultimately, post-graduation intentions. Participants were 414 students in all four grades, in 10 rural, public high schools. Correlation and path analyses (in LISREL 8.58) were utilized to identify significant paths and test model fit. All paths in the final model were statistically significant and demonstrated good fit. Among environmental factors, teacher support predicted student interest in subject matter. Of personal characteristics, learning goals and perceived competence most strongly predicted interest and achievement, and content-related perceptions of instrumentality and value strongly predicted class effort as well as future intentions to finish high school and go on to postsecondary education. Overall, these rural students exhibited positive motivational profiles for learning, apart from achievement. However, the MANOVA analysis demonstrated significantly lower motivational profile for math than for all other subjects.

Introduction

Recent debates in rural research alternately call for greater empirical rigor (i.e., use of experimental designs) to improve generalizability (Arnold, Newman, Gaddy & Dean, 2005) as well as sensitivity to the uniqueness and individuality of rural communities (Barley & Beesley, 2007; Howley, Theobald & Howley, 2005). The present study used a largely exploratory approach to examine the relationship between student characteristics, motives, and environmental perceptions, on the one hand, and effortful engagement and school-related intentions, on the other. It was our aim to develop a more parsimonious description of the relationship between motivational constructs in rural schools and to examine the relationships between these variables in the rural context. For the purposes of this study, we devised a proposed path model of the relationships among our variables of interest, realizing that considerable model respecification might be necessary in order to achieve a well-fitting and theoretically meaningful final model.

Focus on Rural Schools

Compared to work in urban and suburban educational settings, relatively little systematic research has been done in rural schools (Gándara, Gutièrrez & O'Hara, 2001). Over 30% of U.S. schools are in rural communities, yet less than 6% of research conducted in schools has included rural schools (Hardré, 2008). Rural schools serve large numbers of minority students, families in socioeconomic distress, and many single-parent families with little education (Flora, Flora & Fey, 2003; Khattri, Riley & Kane, 1997; National Center for Educational Statistics, 2004; Stern, 1994). Rural students are at risk for low motivation and lack of school success (D'Amico, Matthes, Sankar, Merchant & Zurita, 1996; Lichter, Roscigno & Condron, 2003; National Research Council, 1993). Most rural schools offer fewer support and extracurricular programs overall than do non-rural schools (Ballou & Podgursky, 1995; National Center for Educational Statistics, 2004), and teachers are often required to be an "expert" in multiple subject areas for multiple grade levels (Colangelo, Assouline & New, 1999; Fowler & Walberg, 1991; Lemke, 1994). Dropout rates in some of the more remote rural schools is well over twice the national average (National Center for Educational Statistics,

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2001), and rural students often drop out or discontinue their educations prematurely (Gándara, Gutiérrez & O'Hara, 2001; Kao & Tienda, 1998). Rural communities are unique (Colangelo, Assouline & New, 1999; MacTavish & Salamon, 2003), and local values and opportunities exert influences on the attitudes of students and their families about education and careers, for better or worse (Barley & Beesley, 2007; Flora, Flora & Fey, 2003; Gándara, Gutierrez & O'Hara, 2001). As such, rural education must attend to local differences (Howley, Theobald & Howley, 2005) yet also offer outcomes that generalize meaningfully across a variety of rural contexts (Arnold, Newman, Gaddy & Dean, 2005).

Among rural researchers and practitioners there is a concern that centralizing and consolidating school governance, and a focus on individuals without consideration of communities oversimplifies the complex nature of education, devaluing the unique contributions of educational contexts generally and rural places in particular (DeYoung, Howley & Theobald, 1995). Patterns of ideas, feelings and values from social and community contexts integrate into the identities of youth (Greenwood, 2009), in ways that often persist into adulthood (Hektner, 1995). Local community values may differ from and even conflict with school-based values and goals framed on a national, rather than local model (Corbett, 2009). Schools often focus on preparing youth for lives and jobs very different from where and how they live currently (Woodrum, 2004), and very different from the lives of their parents (Howley, Harmon & Leopold, 1996). Schools may focus on national tests over local workplace skills (Woodrum, 2004), and the values of mobility, acquisition and status over values of family, stability and local roots (Howley, Harmon & Leopold, 1996). While educational systems may claim that these external aspirations and goals are productive and necessary, local communities and cultures of origin may esteem and respect skills for facing different types of challenges and demands, both intellectual and contextual (Corbett, 2009; Faircloth, 2009; Woodrum, 2009). Students confronted with these contrasting messages may experience emotional and personal conflict (DeYoung, Howley & Theobald, 1995; Faircloth, 2009), and it may cause them to be "not resistant to learning, but too often resistant to school" (Corbett, 2009, p.2). Rural youth (compared to non-rural) often experience greater conflict between educational goals and their family connections, and those with such conflicts are more likely to have lower educational aspirations and to delay postsecondary education (Hektner, 1995).

Given the research-demonstrated relationships among characteristics such as local values and opportunities, teacher expertise, career aspirations, and educational motivation, it stands to reason that rural students would be affected by these differences. Findings from studies comparing rural to non-rural schools are mixed (e.g., Gándara, Gutiérrez & O'Hara, 2001; Wolters, Yu & Pintrich, 1996), so that ongoing rural research is indicated (Flora, Flora & Fey, 2003). In motivation, specifically, the research is sparse, but some studies have found patterns consistent with those in non-rural settings (e.g., Yang & Fetsch, 2007), while others have demonstrated patterns of differences (e.g., Hardré, Crowson, DeBacker & White, 2007). It is important not just to compare rural with non-rural students, but also to take educational questions and test them in the specialized setting of the rural school (Hardré & Sullivan, 2009; Holloway, 2002).

Students' Self-Perceptions, Goal Orientations and Environmental Perceptions

Students bring individual motivational characteristics to the classroom including self-perceptions that influence their school success, multiple goal orientations and different types and degrees of motivation (Maehr, 1989; Miller, Behrens, Greene & Newman, 1993). These characteristics are influenced by past and present achievement, feedback from teachers and peers, and features of the current classroom learning environment (Linnenbrink & Pintrich, 2002a; Maehr & Midgley, 1996). The motivations that students develop in school influence their future goals, expectations and intentions (Maehr & Midgley, 1996; Pintrich, 2003). Some of these motivations and future outcomes are generalized to school overall, while others are specific to certain subject areas and classes (Linnenbrink & Pintrich, 2002b).

Self-Perceptions

The present study examined student self-perceptions including perceived ability, competence, value, instrumentality, self-efficacy, future goals and interest. Perceived ability (and the closely related construct of perceived competence) refers to the degree to which the student feels able to learn the content and accomplish given tasks. These perceptions are subjective, situational, and domain-specific, and they powerfully impact the academic choices that students make (Eccles & Wigfield, 1995; Meece, Wigfield & Eccles, 1990; Miller, DeBacker & Greene, 1999; Pintrich & Schunk, 1996; Wigfield & Eccles, 2000). They are linked to breadth of past experiences, and to present and future opportunities (Meece, Wigfield & Eccles, 1990), which may vary in different community contexts, such as rural and non-rural (Bleeker & Jacobs, 2004; Stern, 1994; Regional Educational Laboratory at AEL, 2003). Students with high perceived ability put forth effort and persist (Miller, Greene, Ravindran, Montalvo & Nicholls, 1996), especially when they also perceive the content as instrumental to their futures (Reeve, 1996). Perceived ability is itself also sensitive to performance and social feedback by teachers and peers (Elliot, et al., 2000; Sansone & Morgan, 1992).

Students' perceptions of the content also influence motivation (Greene, Miller, Crowson, Duke & Akey, 2004; Pintrich & Schunk, 1996; Sansone & Morgan, 1992). Important individual difference self-perceptions relating to content which are used in the present study include: perceived instrumentality of the class content and skills, and expectations of success in class (Miller, et al., 1996). Task value incorporates interest, perceived importance and perceived utility of the content or work itself (Eccles & Wigfield, 1995). Instrumentality refers to the learner's tendency to ascribe worth and benefits to knowledge and skills in the domain, which in turn influences attention, engagement, and investment (Eccles & Wigfield, 1995; Sansone & Smith, 2000). Perceived instrumentality may be seen as an individual difference in self-perception, because students have different degrees of value for content initially, and students process teachers' strategies differently (Bransford, Brown & Cocking, 1999; Reeve, 1996).

Self-efficacy is a construct arising from social cognitive theory, which represents a measurement of a learner's belief that he or she could successfully organize and perform behaviors that will produce a specific desired outcome (Bandura, 1977). The greater the expectation for success, the more motivational energy a person will exert in initiating and persisting toward success in the face of a learning challenge. Research demonstrates that self-efficacy is a predictor of grades and performance (e.g. Pajares & Miller, 1995; Pietsch, Walker, & Chapman, 2003; Schunk, 1996), but it is not typically tested in conjunction with all of the other self-perception variables considered in this study.

Clearly, students' self-perceptions have a profound influence on the motivation that they bring into a classroom. However, questions remain as to how these variables align and which perceptions are most influential on interest, engagement, achievement and future intentions.

Achievement Goals

Achievement goal orientations are generally divided into at least three goal types: learning (or mastery), performance approach, and performance avoidance (Ames, 1992; Elliott & Church, 1997; Elliot & Dweck, 1988; Maehr & Midgley, 1996). Learning goals are operating when the learner engages out of a personal, internal desire to know and understand content and master skills (Ames, 1992). Performance approach goals are operating when the learner tries to outperform others based on external social pressure and comparisons (Church, Elliot & Gable, 2001; Greene & Miller, 1996). Performance avoidance goals are operating when the learner evades or fails to complete work to avoid looking incompetent to others (Elliott & Harackiewicz, 1996). Learning goals are adaptive for all students, whereas performance goals present more ambiguous outcomes (Midgley, Kaplan & Middleton, 2001; Pintrich, 2003), as they interact with learner characteristics and with features of the classroom climate (Elliot et al., 2000; Maehr & Midgley, 1996).

Learning Environment

Students' motivation is powerfully influenced by the characteristics of the classroom learning environment (Greene, et al., 2004; Hardré & Sullivan, 2008; Skinner & Belmont, 1993), including elements of teacher and peer support (Greene et al, 2004), and the teacher's interpersonal style of interaction and communication (Black & Deci, 2000; Deci & Ryan, 2002). High school student perceptions of classroom learning environments strongly predict discipline-specific perceptions of competence and instrumentality of the content, as well as goal orientations (Hardré, Crowson, DeBacker & White, 2007; Hardré & Sullivan, 2008), and they can compensate for negative social and ability comparisons (Neighbors & Knee, 2003). Further, student perceptions of autonomy-supportive teacher style predict their self-determined motivation and perceived ability or competence (Hardré & Sullivan, 2008; Ryan & Deci, 2000), and these, in turn, predict students' intentions to complete high school (vs. drop out), even beyond the influences of past and present achievement (Hardré & Reeve, 2003). Environmental characteristics that originate with teachers and peers influence student perceptions of content value and instrumentality (Black & Deci, 2000; Good & Brophy, 1986), perceived ability (Hardré & Sullivan, 2008; Miller et al., 1996; Schunk, 1996), and goals (Urdan, Midgley & Anderman, 1998). Goals and perceived ability, in turn, influence students' strategy use, task preference, attitude toward the class, subject area self-perceptions, achievement and intrinsic motivation (Ames, 1992; Church, Elliot & Gable, 2001; Deci & Ryan, 2002; Elliot et al., 2000).

In sum, a great deal of research has been conducted relating students' self-perceptions to achievement (e.g. Eccles & Wigfield, 1995; Greene et al, 2004; Pintrich & Schunk, 1996; Sansone & Morgan, 1992), achievement goals (e.g. Ames, 1992; Elliott & Church, 1997; Elliot & Dweck, 1988; Maehr & Midgley, 1996) and environmental factors (Greene, et al., 2004; Hardré & Sullivan, 2008; Skinner & Belmont, 1993). However, research is lacking that incorporates all of these variables in the rural context.

Motivational Outcomes

Motivation influences current achievement along with future expectations and intentions (Maehr, 1989; Vallerand, Fortier & Guay, 1997). Engagement is often used as an indicator of motivation in learning and achievement contexts (e.g., Reeve, Jang, Hardré & Omura, 2003; Pintrich, 2003; Greene, et al., 2004). Engagement is the students' attention and focus on achievement-related content and tasks (Hardré, Crowson, DeBacker & White, 2007; Hardré & Sullivan, 2008). Students with more positive motivational profiles in a particular subject area (high perceived ability, instrumentality, learning goals and success expectations) are more likely to take courses in that area and to choose related college majors and career paths (Bleeker & Jacobs, 2004; Deci & Ryan, 2002; Hidi & Harackiewicz, 2000).

Achievement and Future-Oriented Outcomes

Future plans such as finishing high school, postsecondary plans, and career choice are predicted by individual and social factors, including intrinsic motivation (Hidi & Harackiewicz, 2000; Miller, Behrens, Greene & Newman, 1993), previous achievement (Jacobs, Finken, Griffin & Wright, 1998), peer value and support (Kao & Tienda, 1997), and admired adults' valuing of skill in the domain (Jacobs, Finken, Griffin & Wright, 1998). Influences from others are mediated by self-perceptions (Bleeker & Jacobs, 2004; Nicholls, Patashnick & Nolen, 1985), and *perceived* ability or competence is more closely related to future choices than is *assessed* ability (Eccles & Wigfield, 1995). Achievement in school reflects a cumulative assessment of school performance, relevant both at the class level and across subjects and classes. Future intentions represent relevant future extensions of school-related motivation, beyond achievement alone.

Self-Report Measures

Self-report questionnaires have been criticized as inauthentic or susceptible to developmental characteristics and social response pressure (Nitko, 1996). However, high school students are cognitively and developmentally able to know and to report their motivation (Linnenbrink & Pintrich, 2002b; see also Gottfried, 1985) as well as present and future achievement (Linnenbrink & Pintrich, 2002b). U.S. high schools regularly apprise students of their grades, and student-reported GPA correlates highly with school-reported GPA and with a standardized test score (Battin-Pearson et al., 2000). Further, given the internal nature of characteristics such as motivation and intentions (Linnenbrink & Pintrich, 2002b), self-report is the most authentic method of assessment (Hardré & Sullivan, 2009).

Hypotheses and Research Questions

Several research questions arose from our review of the literature. What composite of perceived environmental characteristics, self-perception variables, and goals predict interest among rural high school students? What relationships exist among interest, effort in school, achievement, intentions, and postsecondary plans for rural youth? What is the relationship between students' perceptions of their rural school and community environment and their perceptions about themselves?

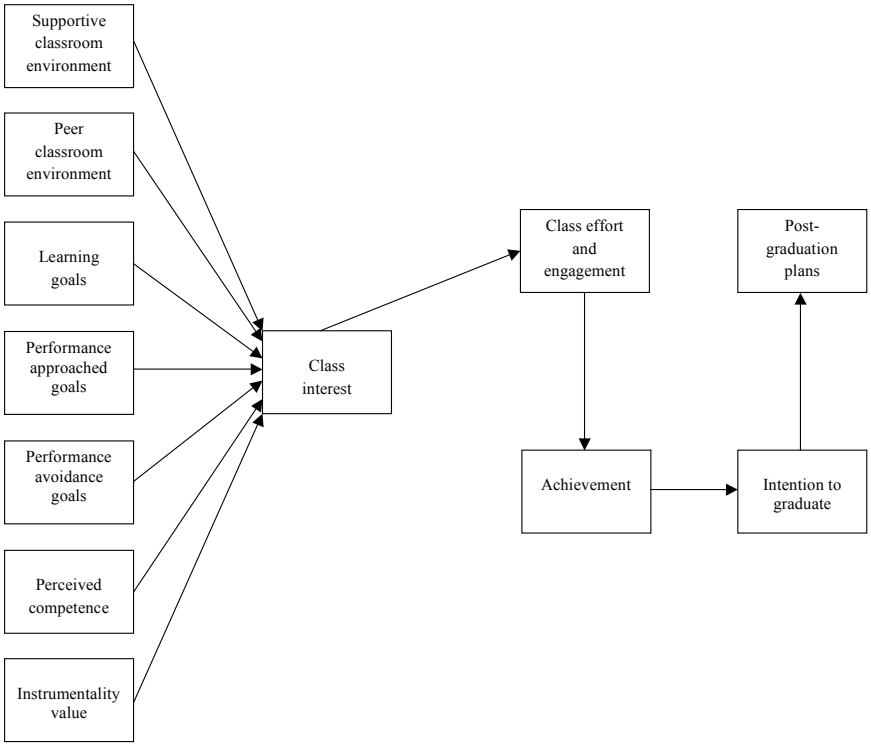

Figure 1. Hypothesized model

Based on the theoretical and empirical literature, we framed a hypothesized model of these relationships and factors of interest (see Figure 1). We hypothesized the following general relationships:

1. Students' perceptions of their environment (teacher support and peer support) and of the content (instrumentality, value) will predict their interest in school-based learning.
2. In addition, students' personal goal orientations (learning, performance approach, performance avoid) and self-perceptions of competence will predict their interest in school-based learning.
3. Interest will predict effort and engagement in school, which will, in turn, predict achievement (grade in class).
4. Achievement will predict intentions to finish high school (vs. drop out) and completion intentions will predict subsequent postsecondary plans (to continue to college or vocational school).

Method

Participants

Participants were 414 students in 10 public high schools in a southwestern U.S. state. Table 1 shows the breakdown of the student sample relating to gender, grade level, ethnicity, overall GPA and grade in the class selected for the present study. The students' age range was 14-19 (mean age 15.70) and the students reported a study-wide average GPA of 3.2. The average grade in the course that the students selected to consider for the present study was 2.9.

Rural Schools and Communities

Given the diversity of rural communities (Adams, 2003) and the misunderstanding that surrounds notions and definitions of rurality (Brown & Swanson, 2003; Yang & Fetsch, 2007), it is critical to identify the definitions used (Howley, Theobald & Howley, 2005) and to describe in detail the characteristics of places in rural research (Coladarci, 2007; MacTavish & Salamon, 2003). All communities in which the schools were located met the criteria for rural places as identified by the United States Office of Management and Budget (Office of Management and Budget, 2000). The schools in this sample were all recognized as rural schools by the Office of the State Regents, and were located in small (population below 2,500), and relatively isolated communities (at least two hours from a major metropolitan area, and one hour from a four-year college or university). These communities were generally low SES (average family income under $23,000 a year) and with a prevalence of low-end jobs (mostly agricultural or low-skill industrial), with low area median education (high school diploma and some vocational training, but a majority without formal postsecondary education). These communities have varying levels of population diversity (some with significant percentages of ethnic minorities, and others mostly White/Anglo) and population stability (vs. instability through outmigration and transience).

Procedures

With the goal of obtaining a representative sample of rural schools, the researchers created a profile of rural schools within the state, on the factors discussed above (SES, remoteness, school size, community population and education, and geographic location within the state). From this list, the 20 candidate schools (invited) were randomly selected, an equal number with each of the profile characteristics, to ensure as representative a sample of rural schools within the state as possible. The 10 schools (50%) that agreed to participate were arrayed equally across those critical characteristics, with no discernable bias within the population of interest. We then obtained administrative consent and arranged on-site visits to the participating schools. All students in the schools were invited to participate. Parental consent was obtained for all minor students, and students also gave direct assent. Because the students constitute a volunteer sample, it was important that they represent a range of achievement levels, and that the courses selected by students represented a range of student interest and achievement, not only their favorite and most successful classes. These assertions are supported by the range of characteristics in Table 1.

Researchers administered the paper-based questionnaires in regular classes to all participants at a given school on the same day using a standard protocol. Students were asked to choose a specific academic class and teacher to consider while responding to the questionnaires (they provided the name of that class and teacher). Only the researchers handled research materials, and they maintained confidentiality on all data. The researchers monitored students to ensure that they were not sharing responses during the questionnaire administration. Courses chosen were distributed across subject areas (e.g., math, sciences, English, social studies and history, foreign languages), and course grades represent a range of student interest and achievement. In order to create greater equivalence of groups in terms of sample sizes, the classes selected by students were categorized into four subject area groups: math, science, English/social studies and other.

Students were instructed that if they did not know or did not want to answer a particular question (i.e. GPA, grade in class, ethnicity) that they should leave the item blank. Any students with missing data on any motivational construct (i.e. self-perception, environmental perceptions, achievement goals and class investment variables) were removed from the data set (141 cases removed). However, students with missing data from single demographic items (e.g. GPA, grade in class, gender, grade level) were not excluded.

Table 1

Profile of the Sample Participants' Characteristics (N=414)

	Frequencies*	Percent of Sample*
Gender		
Male	157	38%
Female	256	62%
Missing	1	.2%
Race		
White	279	67%
Black	41	10%
Latino	44	11%
American Indian	39	9%
Other	5	1%
Missing	1	.2%
Grade in School		
Grade 9	141	34%
Grade 10	128	31%
Grade 11	92	22%
Grade 12	53	13%
Father's Education		
Less than high school	65	16%
High school only	133	32%
Some vocational, but no college	32	8%
Some college, but no degree	56	14%
Two-year degree program	29	7%
Four-year college degree	53	13%
Four-year degree plus graduate work	12	3%
Graduate degree	17	4%
Missing	17	4%

Continued

Table 1 continued

	Frequencies*	Percent of Sample*
Mother's Education		
Less than high school	59	14%
High school only	100	24%
Some vocational, but no college	37	9%
Some college, but no degree	72	17%
Two-year degree program	27	6%
Four-year college degree	57	14%
Four-year degree plus graduate work	27	7%
Graduate degree	21	5%
Missing	14	4%
Grade Point Average		
1.9 & below	4	1%
2.0-2.9	80	19%
3.0-3.9	210	51%
4.0+	59	14%
Missing	61	15%
Subject Area (of class reported)		
Math	198	48%
Science	91	22%
English & Social Studies	52	13%
Other	73	18%
Grade in Class		
1.9 & below	62	15%
2.0-2.9	60	15%
3.0-3.9	128	31%
4.0	164	40%

Instruments

The self-report questionnaires included demographics and assessed motivation-related constructs for a single class for each student, school-related effort, and school-related future intentions. Constructs included the following: perceptions of the classroom learning environment (teacher support and peer support); self-perceptions (perceived ability, instrumentality, value, self-efficacy, interest) in the domain of study; goal orientations (i.e., learning, performance approach, and performance avoidance); school engagement; achievement (i.e., current grade in the class selected, overall GPA); intention to finish high school; and postsecondary plans.

Teacher support. Students' perceptions of teacher support in the learning environment was measured using the teacher support subscale of the *In My Classroom* (IMC) questionnaire from Greene and Miller (1996) (7 items; Likert-type 7-point scale). Items are arranged as continua, on 1-7 Likert-type numeric scales, with parallel, positively- and negatively-phrased items anchoring the end points. Sample items: "In this class mistakes are considered a normal part of learning/ In this class mistakes are considered a sign that students can't learn" (typical Cronbach's *alpha* = .83-.89).

Peer support. Students' perceptions of peer support within the classroom learning environment were measured using the peer support subscale of the IMC (5 items), the design of which is identical to the teacher support scale described above. Sample items: "In this class students care about each other/In this class students don't care about each other" (typical Cronbach's *alpha* = .71-.85).

Achievement goals. Students' achievement goals (i.e., learning, performance approach, performance avoidance), perceived ability, and perceived instrumentality were assessed using the Approaches to Learning (ATL) Questionnaire (Greene & Miller, 1996). Participants respond on a five-point Likert scale (1=strongly disagree to 5=strongly agree). Sample items: "I do my work in this class because I want to understand the ideas" (learning goals), "I do my work in this class because I can show other people that I am smart" (performance approach goals), "I don't do my work in this class so I can avoid looking stupid to others" (performance avoidance goals), "I can do the work in this class" (perceived ability), and "I do my work in this class because knowing the material will be useful in my future" (perceived instrumentality) (typical Cronbach's *alphas* = 75-.90).

Perceived Value. Students' perceived value for learning in the class under study was assessed with the value subscale (three items; 1-7 Likert-type scale) from Hardré & Reeve (2003). Sample items: "Most of what I learn in this class is valuable" and "I value class-related activity and work" (typical Cronbach's *alpha* = .85).

Perceived Self-efficacy. Students' self-efficacy for a particular class was assessed using a contexualized version of the Academic Self-efficacy scale (Tschannen-Moran, Woolfolk-Hoy & Hoy, 1998). The eight items are arranged on a 1-7 Likert-type scale (1=Strongly Disagree to 7=Strongly Agree). Sample items: "I believe that I can manage most classroom challenges" and "I often just don't know how to be successful in this class."

Interest. Students' interest in class was assessed using a 4-item subscale from the Activity-Feelings States scale (AFS; Reeve & Sickenius, 1994). It begins with the stem, "When I am in the classroom, I feel..." and lists items to assess four different descriptors: "Bored," "Involved," "Interested" and "Frustrated." Students respond on a Likert-type 1-7 scale as to the strength of each motivational state (typical Cronbach's *alpha* = .80) (e.g., Hardré & Reeve, 2003; Reeve & Sickenius, 1994).

Effort. Students' school-based effort was assessed with a contextualized version (class level) of the School Engagement and Effort Scale (SEES) from Hardré, Crowson, Xie & Ly (2007). The six items are arranged as continua, on 1-7 Likert-type scales, with parallel, positively- and negatively-phrased items as end points. Sample items: "I don't work very hard in this class/I work really hard in this class" (typical Cronbach's *alpha* = .80).

School achievement. Two indicators were used to assess school achievement: self-reported grade point average, and grade in class. Students were asked to "estimate your overall grade point average (GPA)," and to report their "current letter grade" in the class under study (both on 4-point scales).

Intentions to persist versus drop out. Intentions to persist in, versus drop out of, school were assessed using the three-item scale from Hardré and Reeve (2003), adapted from Vallerand, Fortier & Guay (1997). The items were: "I sometimes consider dropping out of school," "I intend to drop out of school," and "I sometimes feel unsure about continuing my studies year after year" (7-point Likert-type scale, 1 = "not at all" to 7 = "very much so"). This scale predicted actual dropout behavior for high school students one year later (Vallerand et al., 1997), and is sensitive to students' motivational states (Hardré & Reeve, 2003).

Analysis

Reliability analyses were conducted for all scaled variables (e.g., self-perceptions, goal orientation, environmental perceptions and class interest) to ensure adequate internal consistency of measurement. Intercorrelations for all of the subscales verified that the instruments were consistent in producing the theoretically-defined relationships among variables, and to identify statistically significant relationships. MANOVA and

Table 2

Subscale means (m), standard deviations (sd) and Cronbach's alpha reliability coefficient (α)

	m	sd	α
Student Self & Content Perceptions			
Instrumentality[1]	3.87	.89	.89
Value	5.15	1.27	.81
Perceived Ability[1]	3.15	.36	.89
Interest[1]	4.63	1.29	.72
Self-Efficacy[1]	5.29	1.08	.88
Achievement Goal Orientations			
Learning[2]	3.79	.78	.88
Performance Approach[2]	2.73	.81	.82
Performance Avoidance[2]	1.81	.88	.77
Environmental Perceptions			
Teacher Supportive Environment[3]	5.1	1.18	.81
Peer Supportive Environment[3]	4.5	1.28	.66
Interpersonal Style[3]	5.4	1.2	.90
Current Effort Invested			
Class effort & Engagement	4.49	1.17	.81
Achievement & Postsecondary Outcomes			
Grade in Class[4]	2.88	1.18	NA*
Intentions to Graduate[3]	6.4	1.11	.81
Post-Secondary Expectations[4]	3.54	.83	NA*

Note: 1-Converted to z-score; 2-based on a 5 point Likert; 3-based on a 7 point Likert; 4- based on a 4.0 scale; *NA: Not applicable as only one indicator was necessary for the subscale.

follow-up analyses provided information on possible group differences present in the data as a function of the class students held in mind when completing our measures. Finally, path analysis was conducted to test a proposed model of the predictive relationships among the variables under study, respecifying the model as needed.

Results

Internal Reliability Analysis

Table 2 shows the means, standard deviations and reliability coefficients for each subscale used in the present study (most ranged from .72 to .90 and were considered

acceptable). Peer support was the only subscale with a reliability of less than .70 (α = .62), but we retained the scale in order to more completely capture the environmental perceptions of the classroom. However, inferences from this scale should be made cautiously due to the low reliability.

MANOVA Analysis

We conducted a one-way MANOVA with univariate follow-up tests in order to explore the possibility of between-groups differences on the set of our measures as a function of the course subject (i.e., the independent variable, coded 1=math, 2=science, 3=technology, 4=English, 5=social studies, 6=other). The multivariate test was statistically significant, Wilks λ = .736, F(60, 1947.061) = 2.195, p<.001, partial η^2 = .059, indicating that scores on the set of measures varied as a function of subject matter. Box's test was nevertheless statistically significant (p < .001) indicating a violation of the assumption of homogeneity of variance-covariance matrices. Interestingly, despite substantial differences in cell sizes associated with the subject matter areas, the cell size/cell variance relationship suggested that the likely effect of the violation was a more *conservative* test of group differences (see Stevens, 2002).

An examination of the univariate ANOVA tests revealed five statistically significant differences on the following dependent measures as a function of subject matter: perceived competence [F(5, 426) = 3.480, p = .004, partial η^2 = .039], class effort [F(5, 426) = 3.138, p = .009, partial η^2 = .036], post graduation intentions[F(5, 426) = 4.138, p = .001, partial η^2 = .046][1] , school achievement [F(5, 426) = 7.935, p < .001, partial η^2 = .085], and performance avoidance goals [F(5, 426) = 2.755, p = .018, partial η^2 = .031]. Tukey's post hoc tests revealed significant pairwise mean differences between subject matter groups on the following variables: perceived competence [English (Mean = 4.746) versus Math (Mean = 4.345); p = .003]; class effort [Math (Mean = 4.371) versus Technology (Mean = 5.308); p = .048]; post graduation intentions [Math (Mean = 3.476) versus English (Mean = 3.870); p = .011; Technology (Mean = 3.154) versus English (Mean = 3.870) p = .033]; school achievement [Math (Mean = 2.735) versus English (Mean = 3.404); p = .002; Math (Mean = 2.735) versus Other (Mean = 3.619); p < .001; Science (Mean = 2.623) versus English (Mean = 3.404); p = .001].

Correlation Analyses

Due to fairly high intercorrelations among our measures of self-efficacy, perceived ability, and perceived competence[2], we combined these variables to form a single composite measure of "perceived competence" for all subsequent analyses. Similarly, we combined our measures of perceived value and perceived instrumentality[3] into a single composite measure of "instrumentality/value."

The resulting correlations largely fell in theoretically expected directions (see Table 3 for correlations). Of particular note, perceived competence exhibited strong positive correlations with school achievement, perceived instrumentality/value, class effort, learning goals, class interest, and intention to graduate. Instrumentality/value, in turn, exhibited strong positive correlations with class effort, class interest, and learning goals. Instrumentality/value also exhibited a fairly strong correlation with perceived classroom supportive environment. Class interest was highly and positively related to learning goals, while intention to graduate exhibited a moderately high positive correlation with perceived competence. Finally, class effort exhibited strong positive correlation with class interest and learning goals.

Path Analyses

We conducted path analysis on our data using LISREL 8.58 in order to test our hypothesized model (see Figure 1). Parameters were estimated using maximum likelihood estimation, and missing data were treated using pairwise deletion. We estimated the fit of our model by consulting the following fit indices: Comparative Fit Index (CFI), Non-Normed Fit Index (NNFI), Standardized Root Mean Square (SRMR), and the Root Mean Square Error of Approximation (RMSEA), along with its 90% confidence interval. CFI and NNFI values around .95 or greater, SRMR values less than .08, and RMSEA values at or less than .05 are considered indicative of close fit (Byrne, 2005). According to Kline (2005), SRMR less than .10 and RMSEA values up to .08 can be considered favorable.

The fit of our hypothesized model was fairly poor given the criteria laid out above. The NNFI, CFI, and SRMR values were .78, .89, and .15, respectively. The RMSEA value was .14 (90% CI = .13 $\leq$ .14 $\leq$.16). Standardized path coefficients for our hypothesized model are provided in Figure 2. Two paths in the hypothesized model were not statistically significant (i.e., the path from peer supportive environment to class interest and the path from performance approach goals to class interest). The R-square values for the endogenous variables, class interest and class effort, were .43 and .29, respectively. The R-square values for school achievement, intention to graduate, and intention to pursue post-graduate education were .11, .11, and .11, respectively.

[1] Levene's test for this mean comparison was statistically significant at p < .001. Moreover, the variance of the Technology group (n = 13) was larger than that observed for the remaining groups, suggesting that the ANOVA test was functioning liberally in this case (see Stevens, 2002).

[2] Correlations among these measures ranged from .664 to .685 (p's < .001).

[3] The correlation between these measures was .632 (p<.001).

Table 3

Sample correlation matrix

		1	2	3	4	5	6	7	8	9	10	11	12		
1.	Achievement	-	.240**	.326**	.335**	.330**	.100*	.264**	.335**	.355**	.194**	-.364**	.622**		
2.	Post-graduate intentions		-	.298**	.207**	.212**	.035	.149**	.342**	.190**	.066	-.169**	.268**		
3.	Instrumentality/value			-	.612**	.558**	.214**	.447**	.421**	.713**	.317**	-.132**	.589**		
4.	School effort				-	.546**	.105*	.394**	.263**	.585**	.233**	-.149**	.471**		
5.	Class interest					-	.179**	.389**	.324**	.580**	.244**	-.109*	.540**		
6.	Peer supportive environment						-	.294**	.065	.227**	.018	-.028	.147**		
7.	Teacher/classroom supportive environment							-	.256**	.400**	.135**	-.143**	.432**		
8.	Intention to graduate								-	.354**	.181**	-.214**	.458**		
9.	Learning goals									-	.362**	-.170**	.619**		
10.	Performance approach goals										-	.274**	.336**		
11.	Performance avoidance goals											-	-.435**		
12.	Perceived competence												-		

Notes. ** p < .01, * p < .05.

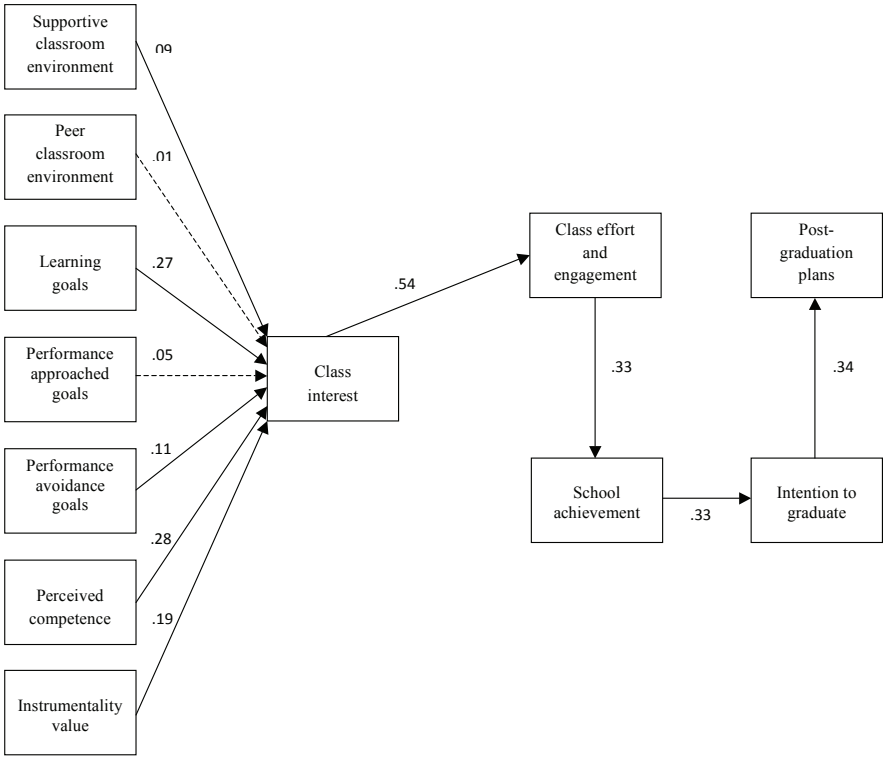

Figure 2. Standardized path coefficients for hypothesized model

We respecified the initial hypothesized model in order to determine if we could identify a better fitting model that was also theoretically defensible. An examination of the standardized residuals from the original model revealed a considerable misspecification between our perceived competence and instrumentality/value measures and our index of intention to graduate. Moreover, we observed a large standardized residual for the relationship between perceived instrumentality/value and class effort and between school achievement and perceived competence. Paths were, therefore, added between (a) perceived competence and instrumentality/value and intention to graduate, (b) perceived instrumentality/value and class effort, and (c) perceived competence and school achievement. Moreover, we deleted the paths that were not statistically significant in our initial model. Because peer supportive environment and performance approach goals did not appear to contribute to the prediction of the endogenous variables in the initial model, these variables were also deleted from the respecified model.

The fit of our respecified model was a considerable improvement over our initial model [NNFI = .97, CFI = .98, SRMR = .05, RMSEA = .068 (90% CI = .052 ≤ .068 ≤.085)]. The R-square values for the endogenous variables, class interest and class effort, were .43 and .43, respectively. The R-square values for school achievement intention to graduate, and intention to attend postsecondary education were .39, .25, and .11, respectively. Only one path in the model failed to attain statistical significance, the path from class effort to school achievement. We made two final modifications to our model based on the findings associated with the initially respecified model. Specifically, we deleted the path from class effort to school achievement and added a direct path from perceived competence to intention to pursue postgraduate education. These modifications yielded a slight improvement in fit over the previous model: NNFI = .98, CFI = .99, SRMR = .034, RMSEA = .046 (90% CI = .043 ≤ .059 ≤.076). R-square values for class interest, intention to graduate, school achievement, intention to pursue postgraduate education, and class effort were .43, .25, .39, .14, and .43, respectively. Standardized path coefficients can be found in Figure 3.

Model Estimates Based on Bootstrapped Data

Given the number of modifications made to the original hypothesized model, we were concerned about the possibility of our final respecified model overfitting the data based on chance characteristics of the sample. As such, we used bootstrapping as a way of examining the stability of our model parameters and fit indices and to provide internal

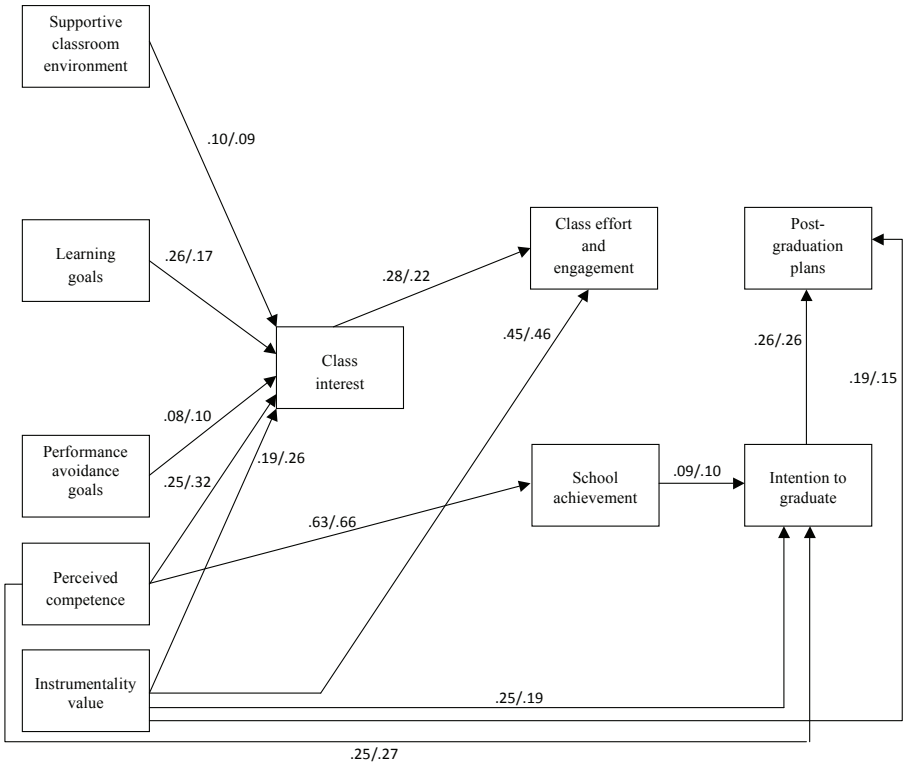

Figure 3. Standardized path coefficients for final respecified model: Sample and bootstrapped estimates
Notes. All paths are statistically significant at $p < .05$. The path from school achievement to intention to graduate was statistically significant at $p < .05$ (one-tailed).

replication of our sample results (Thompson, 2004). According to Thompson (2004), "'the bootstrap' is an elegant computer-intensive internal replicability analysis" that "can be conceptualized as a method of using the sample data in such a manner that the sample data are themselves used to estimate the distribution of a large number of sample results from the population (i.e., the sampling distribution)" (pp. 102-103). With this technique, parameters, standard errors, and test statistics can be "estimated within empirical sampling distributions from large numbers of generated samples" (Kline, 2005, p. 197). Schumacker and Lomax (2004) state that bootstrapping can be quite useful "when replication with additional sample data…is not possible" (p. 295).

For the purposes of our study, we generated 500 bootstrapped samples using LISREL's pre-processing program, PRELIS, and re-estimated the parameters from our final respecified model from the resulting bootstrapped variance-covariance matrix. Based on the fit indices, our final respecified model exhibited good model fit: NNFI = .97, CFI = .99, SRMR = .041, RMSEA = .068 (90% CI = .052 ≤ .068 ≤.085). R-square values for class interest, intention to graduate, school achievement, intention to pursue postgraduate education, and class effort were .46, .23, .43, .12, and .38, respectively. Standardized path coefficients can be found in Figure 3. All paths were statistically significant in the model.

Discussion

Overall, our model indicates that these rural high school students' motivational profile is quite complex. Learning goals, perceived competence and instrumentality/value demonstrated strong influences on interest. Both perceived competence and instrumentality/value also exhibited direct influences on intention to graduate, beyond the effects of achievement. Further, instrumentality/value showed a direct, significant path to postsecondary plans. The more rural students saw the usefulness and value of what they are learning in school, and saw it as contributing toward achieving their goals, the more likely they were to exhibit an interest in school, put forth effort, and exhibit intentions to graduate and go on to postsecondary opportunities. Further, the more they felt competent and believed they could learn and develop skills in a school subject, the more likely they were to demonstrate course-related interest, and intend to graduate and to pursue postsecondary education. These two

variables represent a powerful set of motivational factors, one of which is self-focused (perceived competence) and the other of which is content-focused (perceived instrumentality/value). Both can be influenced by teachers and school-based opportunities. Perceived competence also exhibited a strong predictive relationship to reported achievement (grades), whereas achievement was a significant predictor of intentions to stay in school. However, these multiple paths suggest that it is not only rural high-achievers who stay in school and go on to college or vocational schools, but also that motivational factors may influence valued outcomes (school completion, postsecondary education) for all students, beyond achievement. Not demonstrated as significant in this model was a path from motivation (internal interest or behavioral engagement) to future intentions; instead, the path went directly from perceptions to intentions. The lack of a path from motivation to achievement may be explained by rural students' lack of a clear linkage from effort to grades. This potentially powerful finding invites further research.

Similar to a previous model test of motivation within the rural high schools (Hardré & Reeve, 2003), teacher support demonstrated a significant environmental influence on motivation, and among personal characteristics perceived competence demonstrated a profound influence on school achievement. This model built on the previous one by adding goals and content-focused perceptions, along with class effort and engagement, to explore additional features of the rural motivational dynamic.

The MANOVA for subject area differences found that students responding regarding their math class scored significantly lower on perceived competence, effort, expected achievement, and future intentions than those responding from other subject areas. Much of motivation is subject area specific (Miller & Pajares, 1995), and while subject area difference was not a central focus of this study, the pattern that emerged relative to math is hard to ignore. These rural students demonstrated a lower motivational profile for math than any other subject area, and for all other areas combined. Given the research-demonstrated relationship of motivation to math performance in high school (Pietsch, Walker & Chapman, 2003), this is a matter of concern for rural secondary schools and math teachers.

While past achievement (GPA) as a predictor of current motivation has issues of practical significance and scope, it was not included as a predictor of motivation but rather offered as a possible achievement indicator on the path to postsecondary attainment. We often hear it asserted or merely assumed that an "A" student is a motivated student, and a "C" (or lower) student unmotivated. The paths from motivational perceptions to completion and postsecondary intentions bypassing achievement underscore the potential error in these overgeneralizations of the relationship between motivation and achievement.

We hypothesized that multiple environmental perceptions (teacher and peer support) would be directly related to interest. However, only teacher support was demonstrated to have an important influence on student interest. Peer support emerged as less important in predicting student interest than the remaining exogenous variables in the path model. Although the reliability of the peer support subscale ($\alpha = .62$) was low for this sample, the finding is consistent with previous rural findings (e.g., Hardré & Reeve, 2003; Hardré & Sullivan, 2008), and different from those in suburban school (e.g., Greene et al., 2004), an important point on teacher relatedness. The findings suggest that the teachers and the environment that they create are much more powerful motivational tools in the eyes of these rural high school students than their peer environment.

Rural teachers have a special connection to students that may be less typical in large, non-rural schools (Ballou & Podgursky, 1995), and they use interpersonal relatedness to connect with students in ways that students value and respond to (Hardré, 2007; Hardré, Crowson, DeBacker & White, 2007). Thus, they are positioned to support and engage students, to function as effective role models, to instill value and to inspire. Teachers sensitive to their students' unique differences and to relevant local values can use the strength of their influence in motivating and supporting students, to help shape students into the best of themselves, including the values and opportunities that are part of their home communities (Hardré & Sullivan, 2008). If teachers recognize and communicate the value of the rural environment and encourage students to maximize their own potential *and* to return and invest in their communities of origin, both individual aspirations and community needs can be served.

We hypothesized relationships of all three goal types with interest, expecting learning goals to be positively related, and both types of performance goals to be negatively related. These expectations were based on the theoretical distinctions between the internal and external orientations of these goal types and the internal nature of the interest variable. The strong positive relationship of learning goals with interest appeared as expected. However, performance avoidance goals were also positively and weakly related, and performance approach goals were completely unrelated to interest. The non-significant relationship of performance approach goals was surprising in the strength with which it underscored the internal/external distinction. In previous studies, often in non-rural settings, these differences have not been so strong. This finding suggests that these rural students are oriented (or have been guided) to pursue what they are personally interested in, rather than what is valued by others and pressured on them. Overall, this finding reflects positively on rural students' motivational profile for education.

Instrumentality/value for what they are learning was the most powerful predictor of all of the perceptual variables, apart from perceived competence, and instrumentality is a consistent motivational predictor in both rural and non-rural samples. However, what constitutes instrumentality and how value is presented vary by individual choice and context. Rural economies are generally less diversified and consequently offer greater restriction on occupational opportunities than non-rural areas (Crocket, Shanahan, & Jackson-Newsom, 2000). Some rural students may value job opportunities that (in the short-term) pay well relative to other non-skilled work (e.g. working in the oil fields or local mining industry), while others may sacrifice immediate income to satisfy deeply-held personal values (e.g., working on a family farm or in a multi-generational family business). While both rural and non-rural research shows the importance of perceived instrumentality, it might be a tough sell to convince students of the value of algebra to prepare them for careers in the oil fields, or to see education's long-term value (such as job options after they are not physically able to continue physically-demanding short-term work). As demonstrated in previous studies, rural students share patterns of internal motivational processes with non-rural students, but they may value different subjects and imagine different futures for themselves (Gándara, Gutierrez & O'Hara, 2001; Jacobs, Finken, Griffin & Wright, 1998; Kao & Tienda, 1998). Thus, to tap into this powerful variable of instrumentality, teachers and schools must recognize and expand upon students' present and future interests. Some are generalizable (Eccles & Wigfield, 1995), while others are locally-defined and highly contextualized (D'Amico et al, 1996). Teachers need to educate their students as to how school subjects are instrumental to their career interests.

Given the powerful influential dynamic of perceived competence, and the apparently weak perceived influence of effort, extra care should be taken to ensure that students believe they have the competence to succeed, and that they see their success as due to their own ability and effort (not to luck, accident, or teacher relationships). Convincing students that they have the potential for success does not follow from platitudes or verbal encouragement alone. Competence beliefs result from challenge experiences in which students see the benefit of their own efforts. Competence does not necessarily result from obtaining the correct answer (although that clearly helps). Given the dual contributions of perceived competence and learning goals, if teachers communicate that mistakes are part of learning, and give feedback that develops understanding, then perceptions of competence can be increased. Both deeper understanding and ongoing interest in learning can be gained from learning not just *that* something is so, but also *why*.

Learning goals have a very strong predictive relationship on interest, and interest on effort. Teachers and schools need to instill learning goals in students and to help them formulate clear and realistic goals for their futures. As with the challenge of perceived instrumentality, this is not a matter of importing conventional goals and forcing rural students to adopt them, as importing externally-defined goals and expectations has been linked to the outmigration of promising rural youth (Flora, Flora & Fey, 2003; Gándara, Gutierrez & O'Hara, 2001). Many of these youth do not return to contribute, while others do return in failure, because the goals they sought were not authentic for them, or not a good fit with their intrinsic characteristics and values (Crocket, Shanahan & Jackson-Newsom, 2000; D'Amico et al., 1996). Either way they do not contribute optimally to the strength of their communities of origin and become role models for the students who come after them (Corbett, 2009; Hektner, 1995; National Research Council, 1993). Instead, teachers and administrators may use the strength of their influence along with the connection of rural youth to their local communities, to help them shape uniquely appropriate goals and aspirations that fit with their values and through which they can contribute to their communities (Howley, Harmon & Leopold, 1996; Lemke, 1994).

All of the teacher practice recommendations and cautions regarding general motivation apply even more in mathematics classrooms. These rural students reported across-the-board lower scores for the motivational constructs in math. These factors are related to math anxiety, performance, and intentions (Meece, Wigfield, & Eccles, 1990), and they indicate a need for attention to motivation in math classrooms, both in instructional relevance and in continued research that is cognizant and respectful of local needs and conditions (Howley, 2003).

Limitations

Ours was by necessity a voluntary sample, because both parent consent and student assent to participate were required. As such, it presents a potentially different perspective from a comprehensive or random sample. Further, participants ranged from grades nine through twelve. While no significant grade level differences were found, students in different grade levels were enrolled in different courses within the same subject area. We did analyze for subject area differences, however, course level differences could have existed that we were not able to take into account. For example, do students in Algebra I respond similarly to students in Math Analysis or Geometry? The sheer number of courses and the different course offerings between schools did not allow for consideration at this level. However, a more in-depth, focused analysis may provide additional and interesting insight into this question.

Implications for Future Research

More and different achievement indicators will be useful to further understand the role of achievement relative to subject area motivation (e.g., standardized tests scores, actual grade as well as self-reported grades). These findings are promising, but continuing research on rural students and schools is essential, especially on their motivational characteristics that underlie achievement and future-oriented educational outcomes. We hasten to add here that the continued research should not just aim for broad generalizability of findings, but also for locally sensitive design and methods. Rural researchers must always consider the balance between the macro-level goal of transfer and the micro-level goal of fit.

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